Abstract

A tomographic reconstruction method and system incorporating Bayesian estimation techniques to inspect and classify regions of imaged objects, especially objects of the type typically found in linear, areal, or 3-dimensional arrays. The method and system requires a highly constrained model M that incorporates prior information about the object or objects to be imaged, a set of prior probabilities $P(M)$ of possible instances of the object; a forward map that calculates the probability density $P(D|M)$, and a set of projections D of the object. Using Bayesian estimation, the posterior probability $p(M|D)$ is calculated and an estimated model M_{EST} of the imaged object is generated. Classification of the imaged object into one of a plurality of classifications may be performed based on the estimated model M_{EST} , the posterior probability $p(M|D)$ or MAP function, or calculated expectation values of features of interest of the object.